

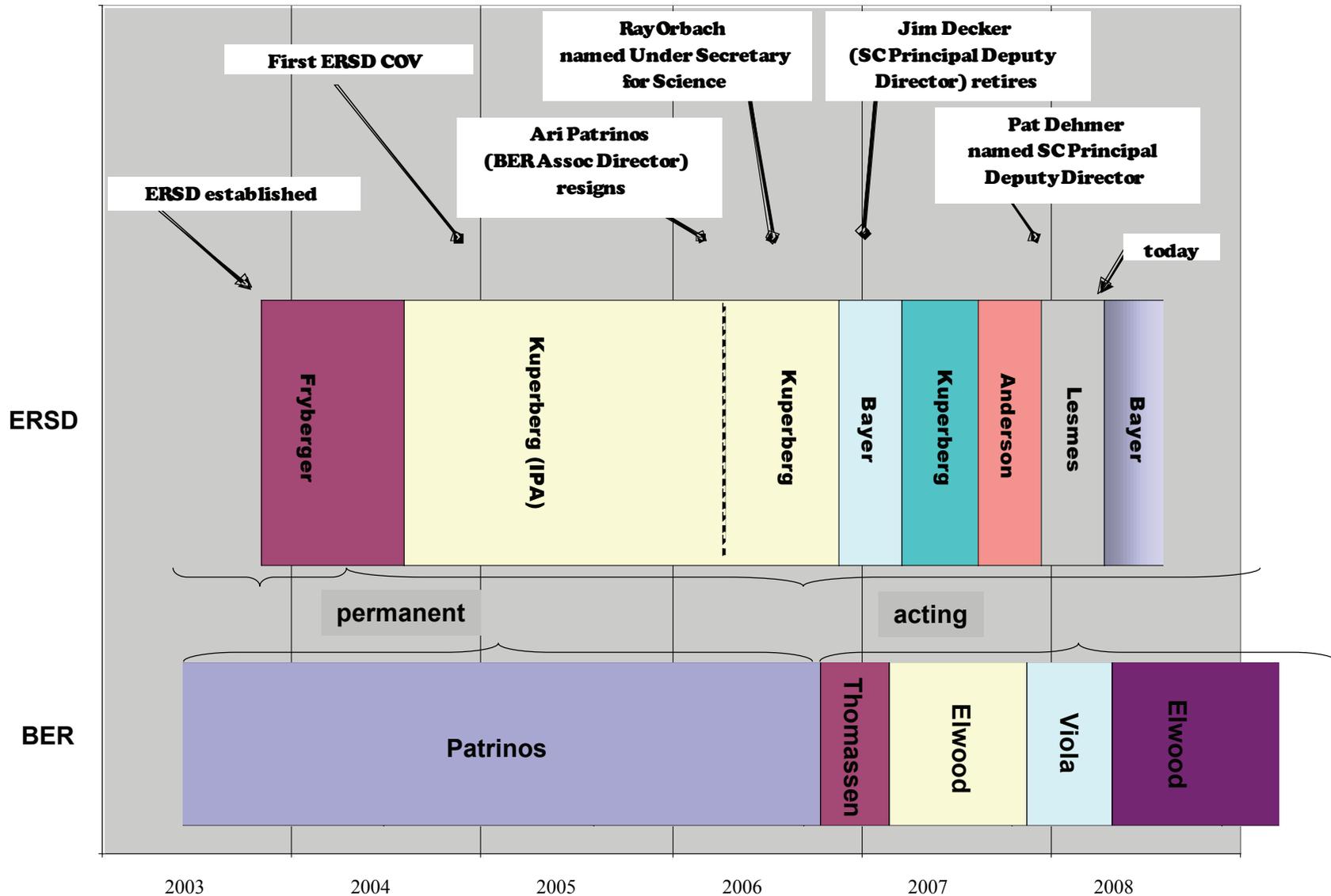
Welcome!

ERSP 2008 Annual Meeting



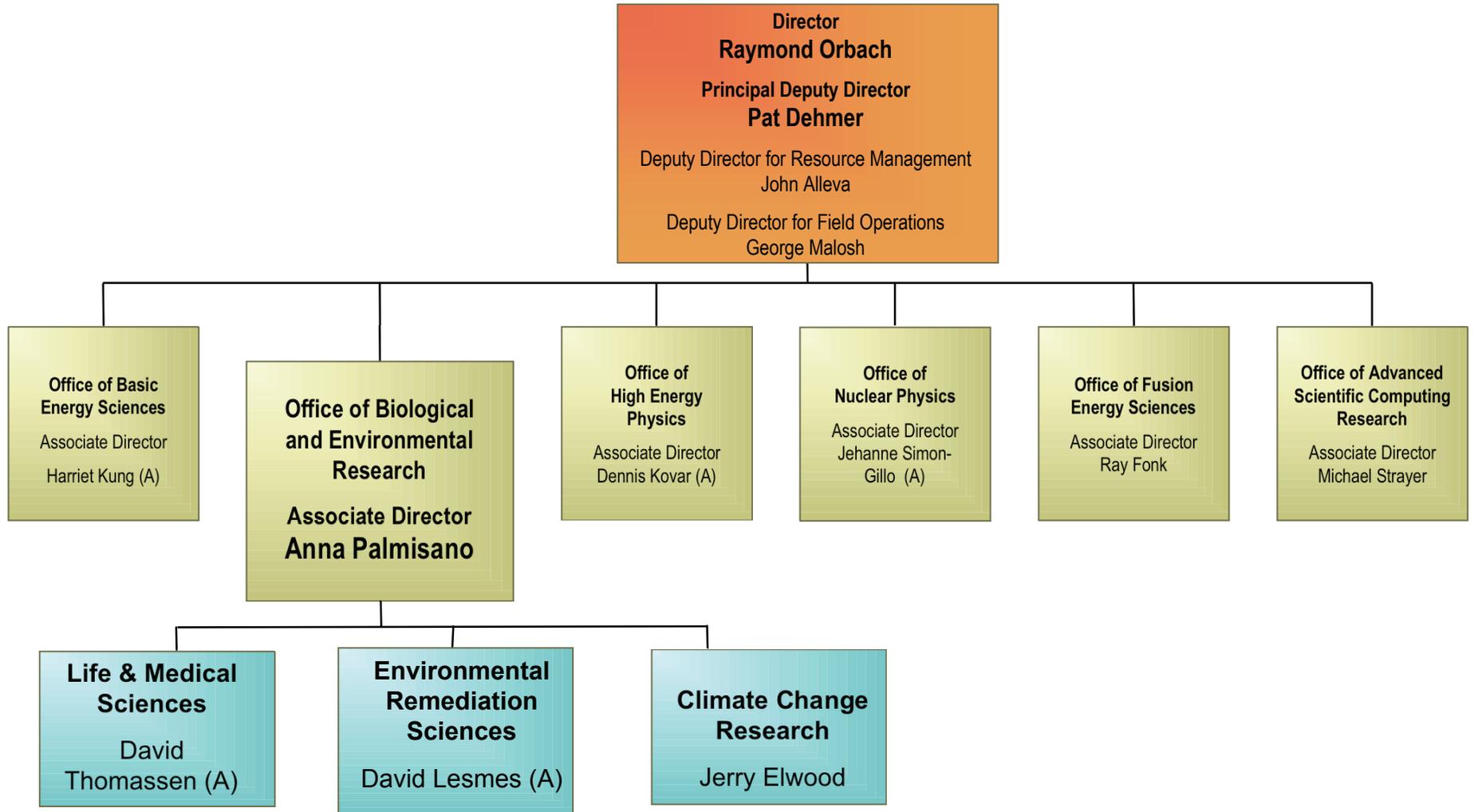


Leadership timeline





DOE Office of Science



Welcome Back!

ERSP 2008 Annual Meeting



U.S. Department of Energy



Office of Science

The State of the ERSP

2008 Annual PI's Meeting

David Lesmes

Acting Division Director

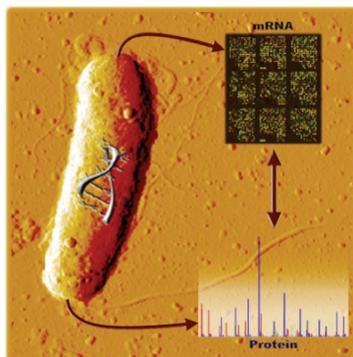
Environmental Remediation Sciences Division

DOE, Office of Science, OBER



Environmental Remediation Sciences Division (~\$90M in FY 2008)

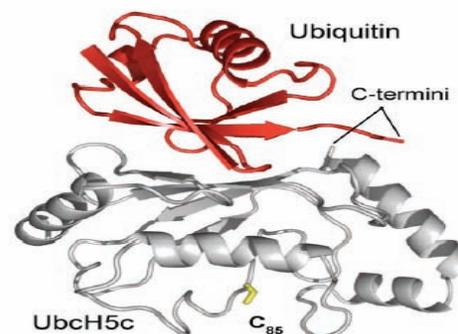
Fundamental research to support DOE's environmental remediation mission. Supports a research program and a national scientific user facility:



Environmental Remediation Sciences Program (ERSP) \$47M

Focus on DOE-relevant Contaminants

- Understand processes controlling contaminant mobility in subsurface.
- Explore new remediation concepts.
- Develop new measurement and monitoring techniques.



Environmental Molecular Sciences Laboratory (EMSL) \$43M

The William R. Wiley Environmental Molecular Sciences Laboratory (EMSL), a U.S. Department of Energy national scientific user facility located at Pacific Northwest National Laboratory (PNNL) in Richland, Washington provides integrated experimental and computational resources for discovery and technological innovation in the environmental molecular sciences to support the needs of DOE and the nation.



ERSD Staff

- David Lesmes – Program Manager/Acting Div. Director
Geophysics/Hydrogeology
- Todd Anderson – Program Manger
Field Biology/ Microbiology
- Paul Bayer – Program Manager
Environmental Science/Project Management
- Roland Hirsch – Program Manager*
Chemistry, Synchrotron science
- Terry Jones - Secretary
- Arthur Katz – Program Manager*
Biomolecular science
- Mike Kuperberg – Program Manager
Biology/Project Management
- Kim Laing – Program Support Specialist



Environmental Remediation Science Program

Research Program Focus

Subsurface Contamination

- vadose zone and saturated zone contamination
- technically challenging problems with no clear solutions

Contaminants of Interest

Radionuclides:

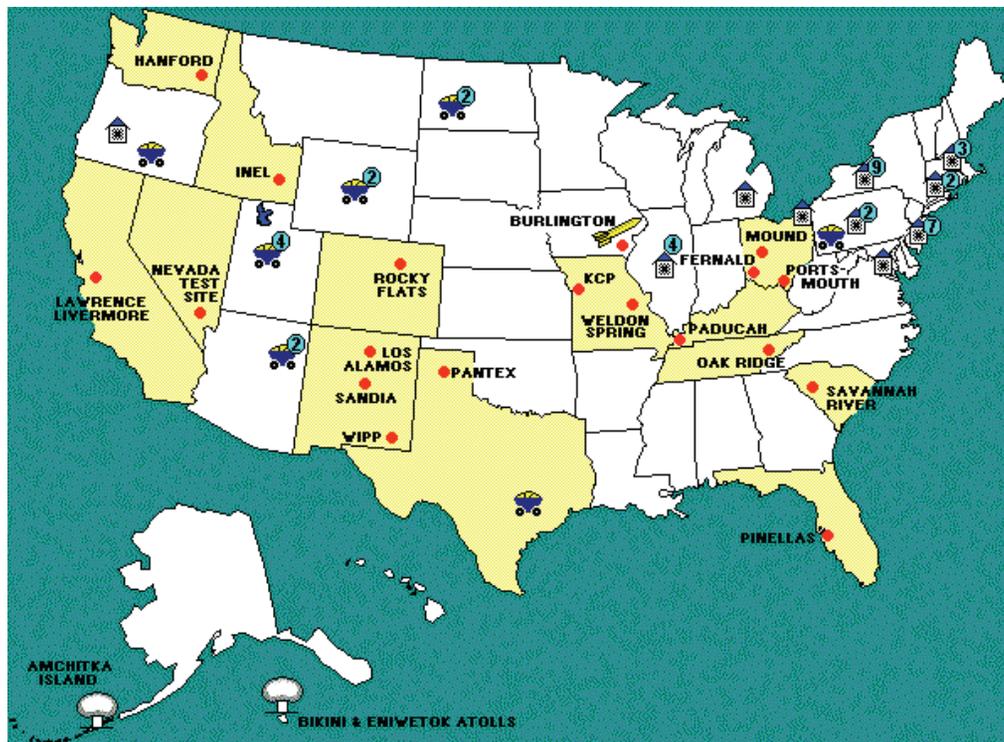
U, Tc-99, Pu, Np-237, I-129,
Sr-90, Cs-137

Non-radioactive metals:

Cr, Hg

Co-Contaminants:

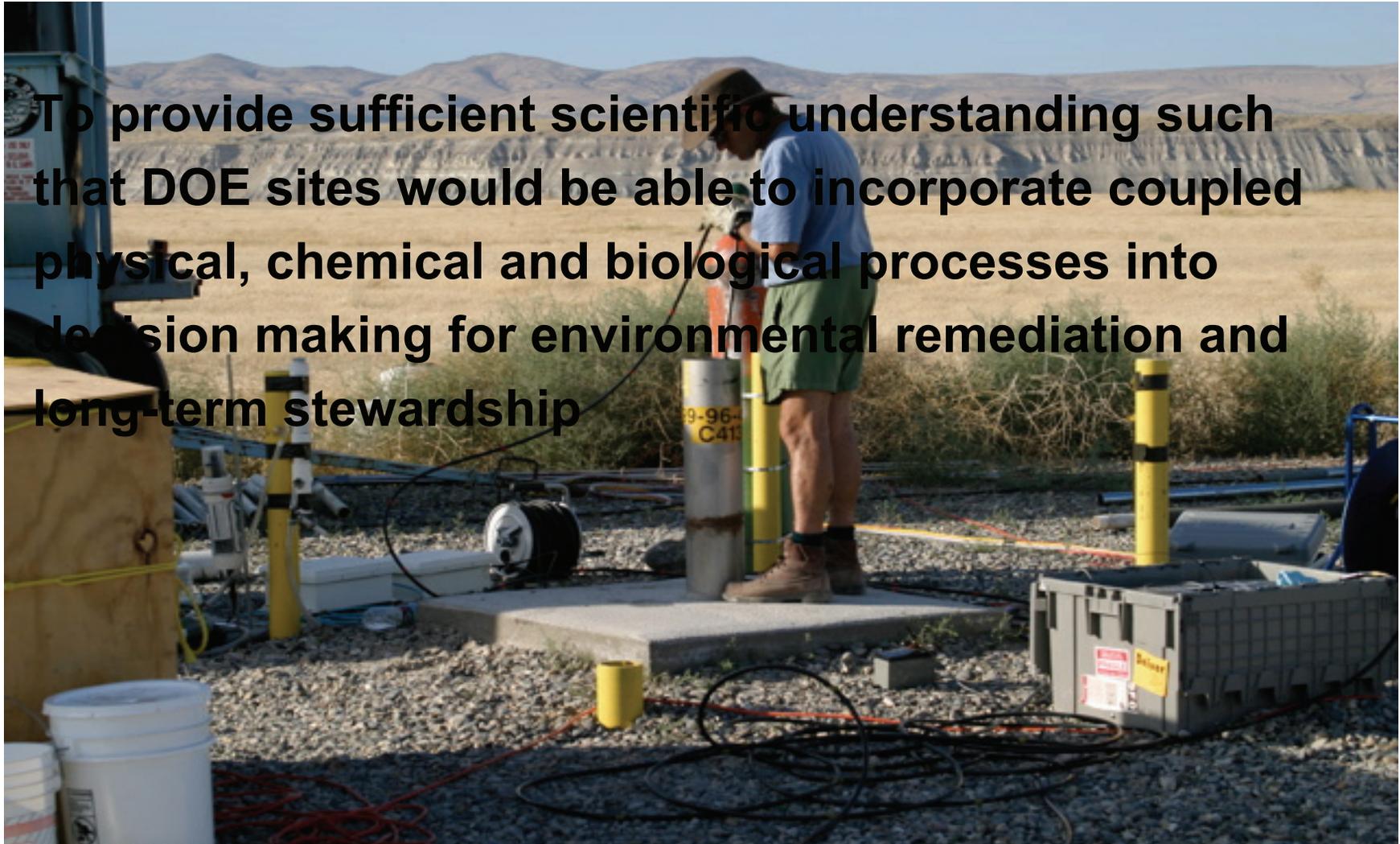
- Nitrate and complexing agents as co-contaminants with the above





ERSP Long-term PART Measure

To provide sufficient scientific understanding such that DOE sites would be able to incorporate coupled physical, chemical and biological processes into decision making for environmental remediation and long-term stewardship





ERSP Strategic Goals

“To advance our understanding of fundamental physical, chemical and biological processes that control contaminant behavior in the environment in ways that help solve DOE’s intractable problems in environmental remediation and stewardship ”

1. Understand and Predict Contaminant Fate and Transport

Develop an improved understanding of the processes governing the fate and transport of contaminants to predict and control the long-term performance of environmental remediation and facilitate stewardship of DOE sites

2. Subsurface Remediation and Long-Term Stewardship

Explore new options and concepts for remediation and long-term stewardship of subsurface systems

3. Measurement and Monitoring

Provide the scientific foundation for new measurement and monitoring tools leading to a better understanding and management of remediation strategies and long-term site stewardship.



Environmental Remediation Science Program

Research Across Scales

Field-scale understanding based on:

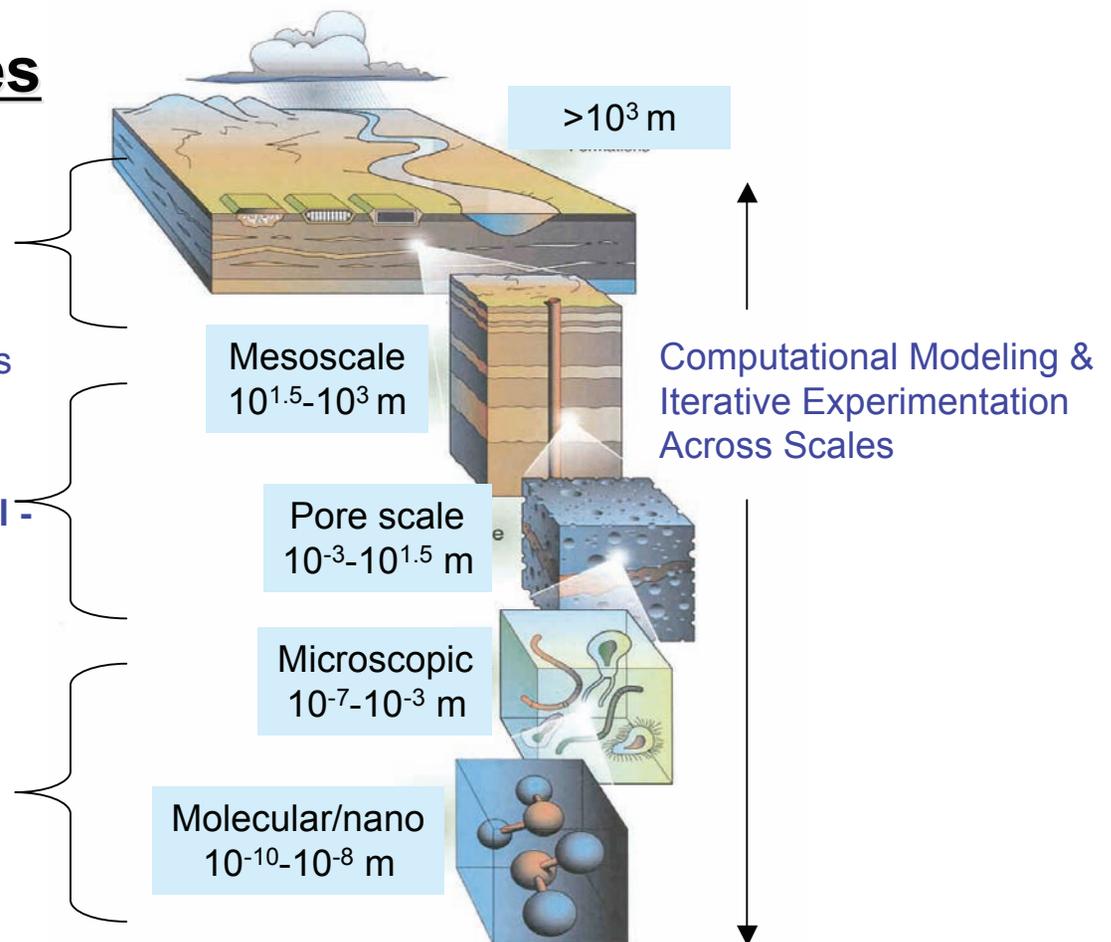
- Column & mesoscale research
- Small-scale field experiments
- Iteration between field experiments and modeling/simulation

Characteristics of groundwater flow affecting contaminant transport at small - intermediate scales:

- advection/dispersion
- diffusion
- stratigraphy (heterogeneity)
- porosity

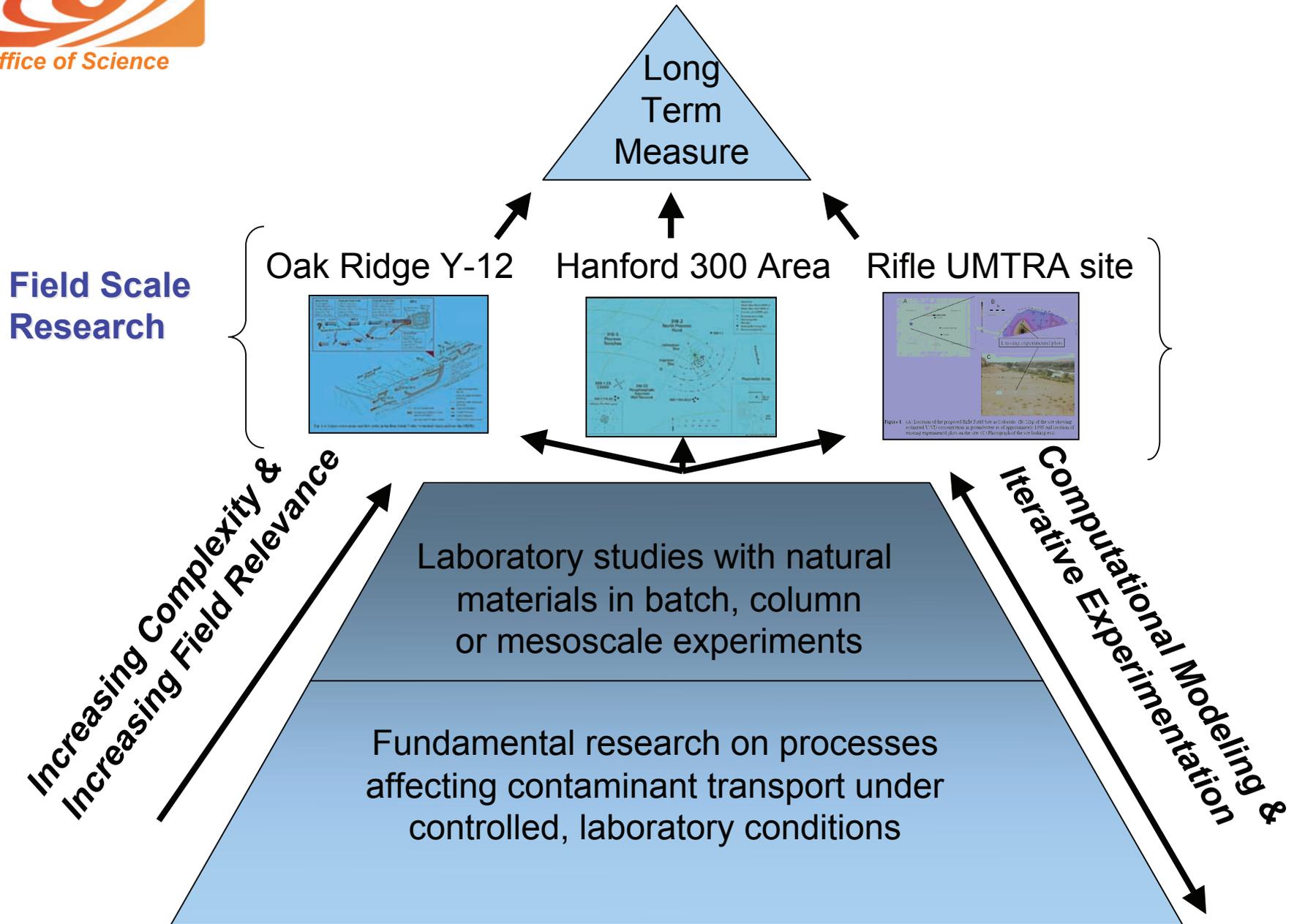
Reactive processes control contaminant transport occur at small scales:

- chemical oxidation/reduction
- biological oxidation/reduction
- adsorption
- precipitation/dissolution





ERSP Research



Field Scale Research

Oak Ridge Y-12

Hanford 300 Area

Rifle UMTRA site

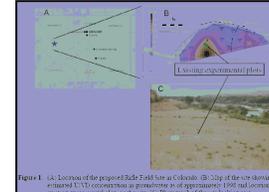
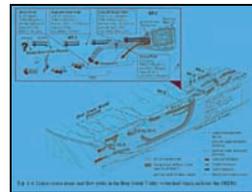


Figure 1. (A) Location of the proposed Rifle Field Site at Colorado. (B) Map of the site showing estimated U, V, concentrations as a function of depth (approximate 1997 rad location of neutral measurement plan for the site). (C) Photograph of the site looking east.

Increasing Complexity & Increasing Field Relevance

Laboratory studies with natural materials in batch, column or mesoscale experiments

Fundamental research on processes affecting contaminant transport under controlled, laboratory conditions

Computational Modeling & Iterative Experimentation

ERSP Science Portfolio

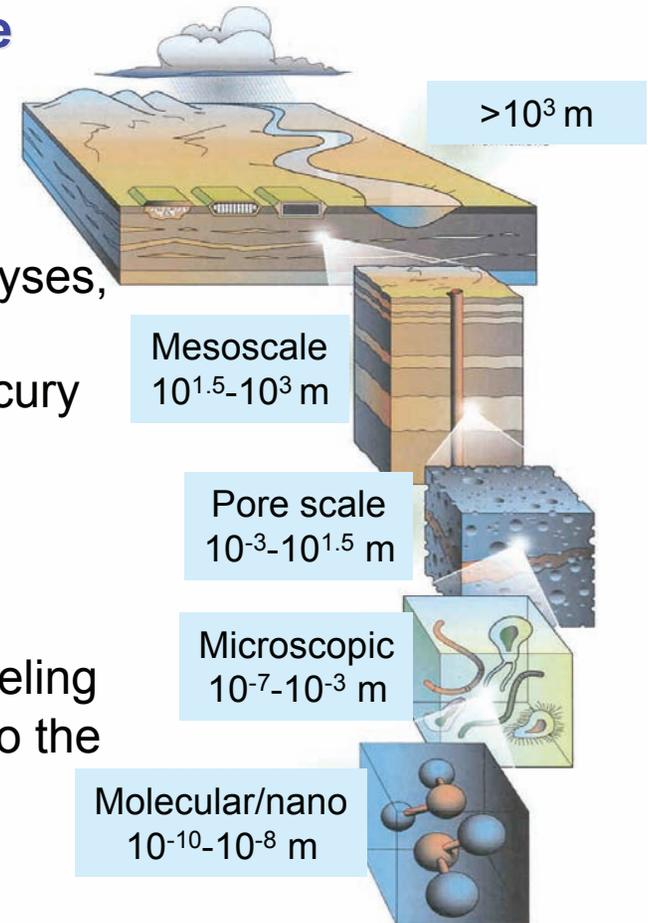
LTM	Strategic Goals	Science Themes	Project Areas	Funding Mechanism
<p>ERSD Long Term Measure</p> <p>By 2015, provide sufficient scientific understanding to allow a significant fraction of DOE sites to incorporate coupled biological, chemical and physical processes into decision making for environmental remediation</p>	<p>Goal 1: Develop an improved understanding of the processes governing the fate and transport of contaminants in the subsurface in order to predict and control environmental remediation and long term stewardship of DOE sites.</p>	Fundamental Molecular Scale Research	Surface Chemistry	EMSL, EMSIs Synchrotron support
			Aqueous Complexes	
			Nanoscale Research	
		Subsurface Biogeochemistry	Microbe-Mineral Reactions	ERSP Research SFA's + Notices
			Contaminant-Mineral Rxns	
		Subsurface Microbiology	Microbial Ecology/Metabolism	
			Microbially Catalyzed Rxns	
		Groundwater Flow and Transport	Aquifer Characterization	
	Groundwater Hydrology			
	Vadose Zone Processes	Geochemical Gradient Rxns		
		Unsaturated Zone Chemistry		
	Conceptual/Computer Model Development	Scaling of Processes	SciDAC	
		3D HPC Framework		
	<p>Goal 2: Explore new options and concepts for the remediation of subsurface environments.</p>	Physical/Chemical Remediation Processes	Immobilization	ERSP Research SFA's + Notices
			Removal Techniques	
Barrier research				
Biological Processes		Bioremediation		
Long Stewardship Research		MNA processes/ Modeling		
Field Scale Research	Fate & Transport/ Remediation Research at Large DOE Test Sites	Field Research Notice		
<p>Goal 3: Develop new measurement and monitoring tools to better understand and manage contaminant transport.</p>	Site Characterization Technologies	Geophysics Techniques Seismic, GPR, EMT etc.	ERSP Research & SBIR/STTR Projects	
	Biological, Chemical and Physical Sensor Technology	Genomics-based techniques		
		Chemical speciation detection		
		Flow detection		
	Autonomous Sampling and Data Collection/Reporting Systems			



Scientific Focus Areas at the National Laboratories (FY09)

Team-oriented Approach to Subsurface Science

- PNNL (~\$6.5M) - Strong emphasis on geochemistry, biogeochemistry and modeling at different scales
- LBNL (~\$4.5M) – Geophysics/hydrogeology, isotope analyses, microbial community dynamics
- ORNL (~\$3M) – Geochemistry, microbial processes, mercury
- ANL (~\$1.5M) – Synchrotron environmental science
- SLAC (~\$0.7M) – Synchrotron environmental science
- LANL (~\$1.2M) – Actinide chemistry and subsurface modeling
- INL (~\$1.2M) – Applied engineering research applicable to the INL site and Sr contamination.



- *Lab programs will be rigorously reviewed*
- *Programs will be collaborative with the University community*



Solicitations for ERSP Research

University Led Research Projects ~\$18M/yr

2007

➤ Environmental Remediation Science Program
DE-PS02-07ER07-18 (approx. \$6M) University-led projects

Pre-apps: 159

Proposals: 117 (104 Full + 13 Exploratory)

Funded Projects (~\$4M): 17 Projects (13 Full + 4 Exploratory)

2008

➤ Environmental Remediation Science Program
DE-PS02-08ER08-09 (approx. \$6M) University-led projects

Pre-apps: 147

Proposals: 106 (79 Full + 27 Exploratory)

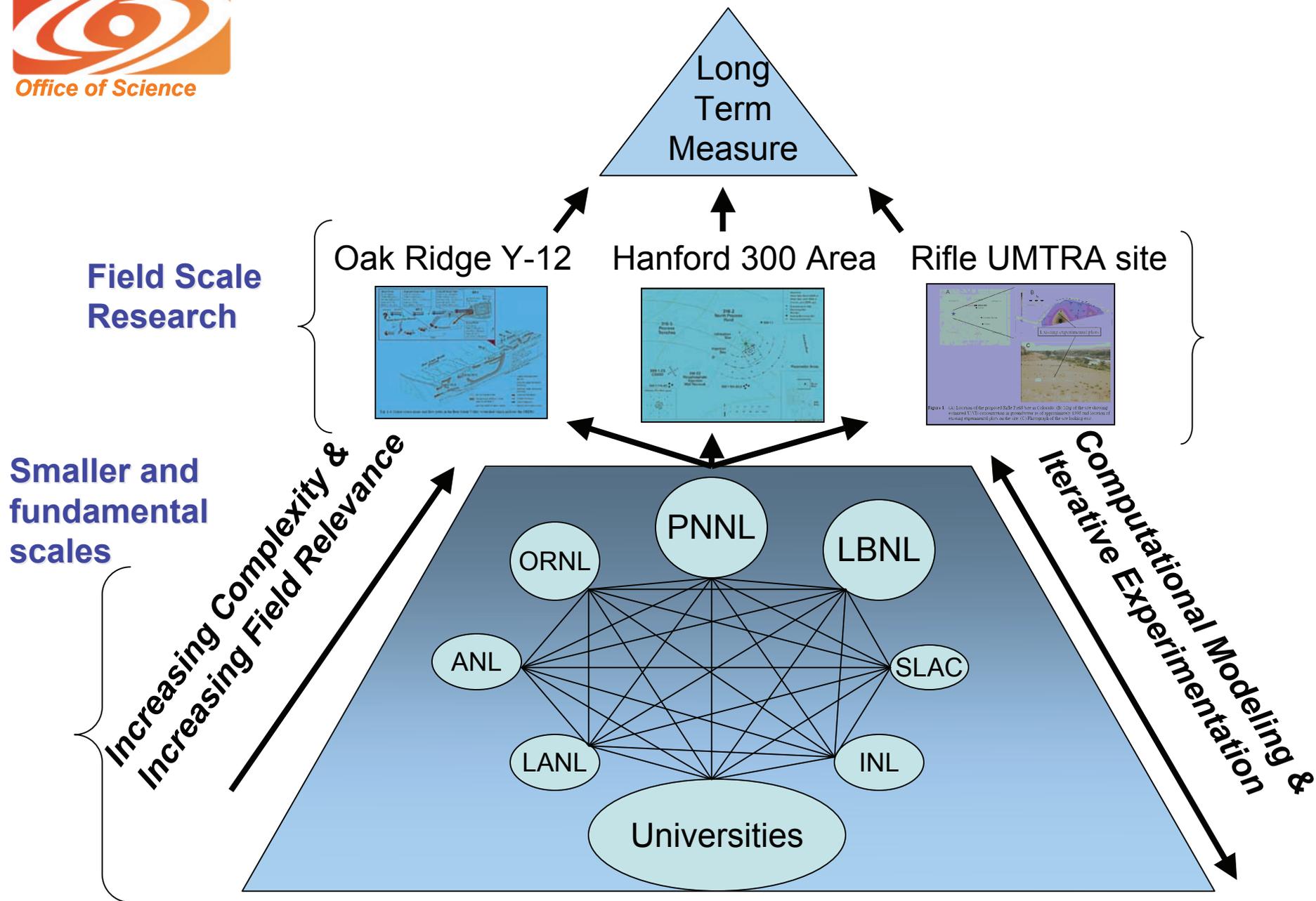
Funded Projects: Panel Review in June

2009

➤ Environmental Remediation Science Program
DE-PS02-09ER09-XX (approx. \$6M) University-led projects – posted in Dec 2008



ERSP Structural Outlook (FY2009)

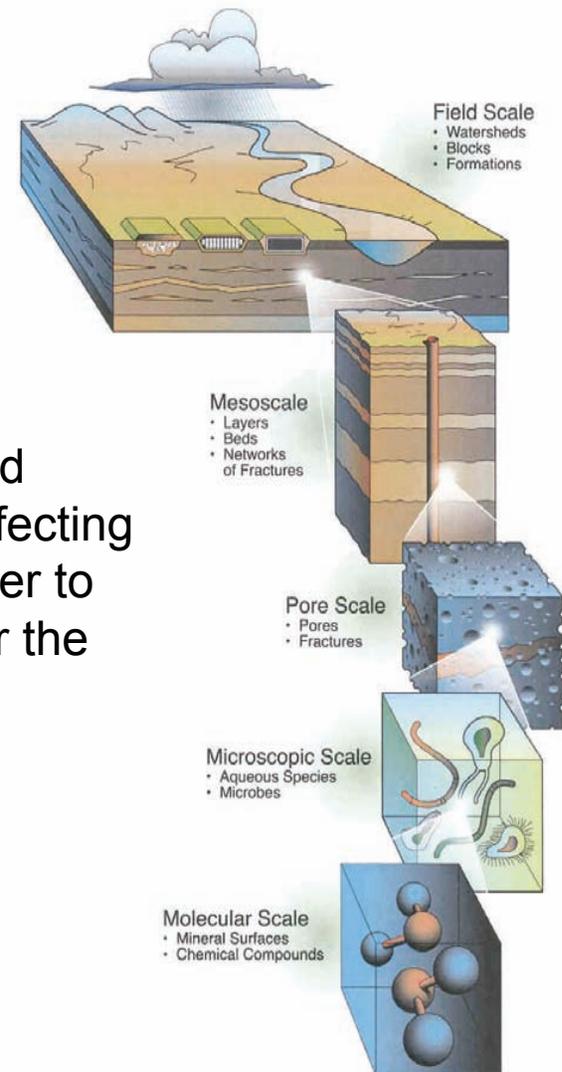




Summary

Create a program that encourages linkages across scales of observation and is oriented towards understanding contaminant fate and transport at the field-scale.

- Orient Laboratory programs and University-led projects towards understanding processes affecting contaminant transport at the field scale in order to provide DOE with science-based solutions for the environment



U.S. Department of Energy



Office of Science

The Process

“How we make the sausage”

Roland Hirsch



COV Review

- COV Reviewers
 - Mike Hochella (Chair), Susan Brantley, Kathy Covert, Randy Cygan, Rich Devereux, Brain Looney, Karl Mueller, Tim Schiebe, Gordon Southam, Donald Sparks, Mavrik Zavarin
- COV Charge
 - Assess the efficacy, fairness, and quality of the processes used to: (a) solicit, review, recommend, and document proposal funding actions, and (b) monitor active projects and programs for progress and outcomes
- Report due to BERAC prior to spring meeting (May 19-20, 2008)



Solicitations for ERSP Research

2005

➤ Natural and Accelerated Bioremediation Research Program
Notice DE-FG01-05ER05-05 (approx. \$1M) Biomolecular Science & Engineering

➤ Environmental Management Science Program
Notice DE-FG01-05ER05-12 (approx. \$7M) Subsurface Fate and Transport

2006

➤ Environmental Remediation Science Program
Notice DE-FG02-06ER06-12 (approx. \$15M total) Five Science Elements

➤ Environmental Remediation Science Program – Integrated
Field-Scale Subsurface Research Challenge
Notice DE-FG02-06ER06-16 (approx. \$6M)

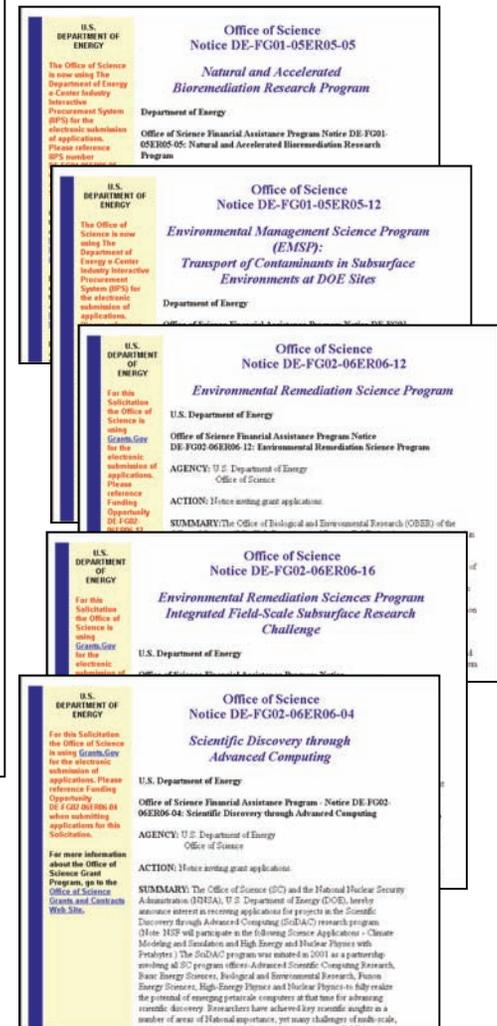
➤ Scientific Discovery through Advanced Computing
Notice DE-FG02-06ER06-04 (ERSD and ASCR approx. \$2M)

2007

➤ Environmental Remediation Science Program
DE-PS02-07ER07-18 (approx. \$6M) University-led projects – awards pending

2008- currently open

➤ Environmental Remediation Science Program
DE-PS02-08ER08-09 (approx. \$6M) University-led projects – posted in Dec 2007





Program Management

Track progress/accomplishment

- Awards, real-world applications
- Website postings of publications (ERSP website and/or the ERSD website)
<http://www.lbl.gov/ERSP/generalinfo/publications.html>

Annual PI meetings (early April each year)

- Mandatory attendance by Lead PIs
- Mandatory poster presentation
- Selected oral presentations

Regular reviews/updates of major program elements

- Quarterly and Annual reports from Field Site lead PIs
- Independent annual review of field sites by the Field Research Executive Committee (FREC)

Annual progress reports from program projects

- University PIs must submit an annual report for continuation of funding
 - Continued funding subject to program manager approval
- Annual FWP submissions for Labs
 - Continuation subject to program manager approval



Intra- and Interagency Coordination

Interagency Steering Committee on Multi-media Environmental Modeling (ISCMEM) (<http://iscmem.sc.egov.usda.gov/>)

(DOE, NRC, EPA, NRCS, USACoE, Bureau of Rec, USGS, NOAA)

Strategic Environmental Research & Development Program (SERDP) (<http://www.serdp.org/>) (DOE, EPA, DoD)

Interagency Collaboration on Environmental Remediation Research (ICERR) Workgroup (DOE, EPA, NIEHS, NSF)

Interagency Groundwater Working Group (IGWG) (<http://www.niehs.nih.gov/sbrp9.cfm>)

Environmental Biotechnology Working Group

(DOE, NSF, SERDP/ESTCP, EPA, ONR)

Research programs with DOE including:

Other BER programs – GTL program,

Basic Energy Sciences (BES) - Geosciences

Office of Groundwater and Soil Remediation (EM-22)

Office Legacy Management – UMTRA program



Peer Review of Proposals, Projects and Programs

- Panel Reviews of Annual Solicitations
 - 47 reviewers for 07-18
- FREC Review of IFC's
 - Richelle Allen-King, Sue Clark, Roger Beckie, Fred Day-Lewis, Rich Devereux, Gordon Southam
- Review of SFA Program Plans
 - Marc Amyot, Fred Dau-Lewis, Rich Devereux, Rod Ewing, Ron Falta, Tim Ginn, JoAnn Holloway, Tissa Illangasekare, Brian Looney, Satish Myneni, Karl Mueller, Peggy O'Day, Jeff Paine, Gary Sayler, Henry Shaw, Niel Sturchio



Responses to 2004 COV Findings

- 📁🕒 Need for integrated research program with an overall strategic plan – *Accomplished*
- 📄🕒 Recruit and retain additional technical and support staff – *Accomplished*
- 📄🕒 Encourage expansion of the funded community – *Exploratory Research Element*
- 📄🕒 Augment review panel breadth – *Larger interdisciplinary review panels + mail reviews*
- 📄🕒 Increase Travel Funds – *Travel budget doubled*
- 🕒🕒 Track demographics – *SC is addressing*



What's next?

- Review and fund 08-09 proposals
- Work with national labs to implement SFA Research Programs
- ERSP Summer Tour of National Labs
- BER Strategic Planning
- Plans for future meetings
 - Workshops (?)
 - Spring 2009 meeting TBA – same timeframe



Agenda for Meeting

- University Led Research Projects
 - Presentations: Monday PM, Tuesday PM, Wednesday AM
 - Posters: Monday and Tuesday evenings
- Integrated Field Challenge Projects
 - Presentations: Tuesday AM
- Scientific Focus Area (SFA) Program Plans
 - Presentations: Wed PM
 - Posters: Wednesday evening
- “Permanent” Posters
 - Student Posters, EMSL, IFC’s, SFA Overviews
- Terry Beveridge Memorial Lecture
 - Grant Ferris, Monday PM



Logistics

- Reminder to Speakers
 - $2 + 30 + 5 \neq 30$
- Terry Hazen
- Lisa Kelly



Thank you!



The Status of BER

- **BER is in a challenging and exciting period**
 - New Bioenergy Research Centers have been launched to lead transformational science for future biofuels.
 - Grand challenges for climate change research will address knowledge gaps in climate forcing, response, and change.
 - New directions in radiochemistry and instrumentation research will meet DOE missions while continuing to underpin needs of the nuclear medicine community.
 - Integrated Field Challenges will explore the mechanisms of contaminant mobility at DOE sites.
 - Planning begins for next generation of field studies on ecosystems impacts of climate change.
- **The FY 2008 Omnibus Bill was funded at the FY 2008 Request**
 - Additional funding was provided from Congress (\$17.5M) for nuclear medicine research
- **The FY 2008 Appropriation follows two years that brought:**
 - Significant increase for the Genomics: GTL Bioenergy Research Centers
 - Near level funding for climate change and medical applications research
 - Partial restoration of FY06 reduction for environmental remediation sciences research



The Plan for BER

- **Our goal is a unique program of world-class, fundamental research and scientific user facilities that:**
 - underpin DOE’s energy, environment and basic research missions
 - provide novel insights into biological and environmental systems from the molecular to the ecosystem scale
- **A vision for BER’s future must include a scientifically compelling plan that:**
 - addresses grand challenges in biology and the environment
 - engages and is supported by the scientific community, the Administration, Congress, and the public
 - provides leadership and coordination with our interagency partners across all elements of the BER program
- **The scientific community is critically important:**
 - BER’s research portfolio has a broad constituency across many fields of science and is acknowledged to play a unique role in key mission-relevant areas.
 - The scientific community and BERAC need to develop strategies to better identify and communicate long-term BER basic research needs for tackling our Nation’s energy and environmental challenges.
 - The scientific community needs to make the case for the science, and its benefits to the Nation, to Congress, and to the public. Funding is not an entitlement.

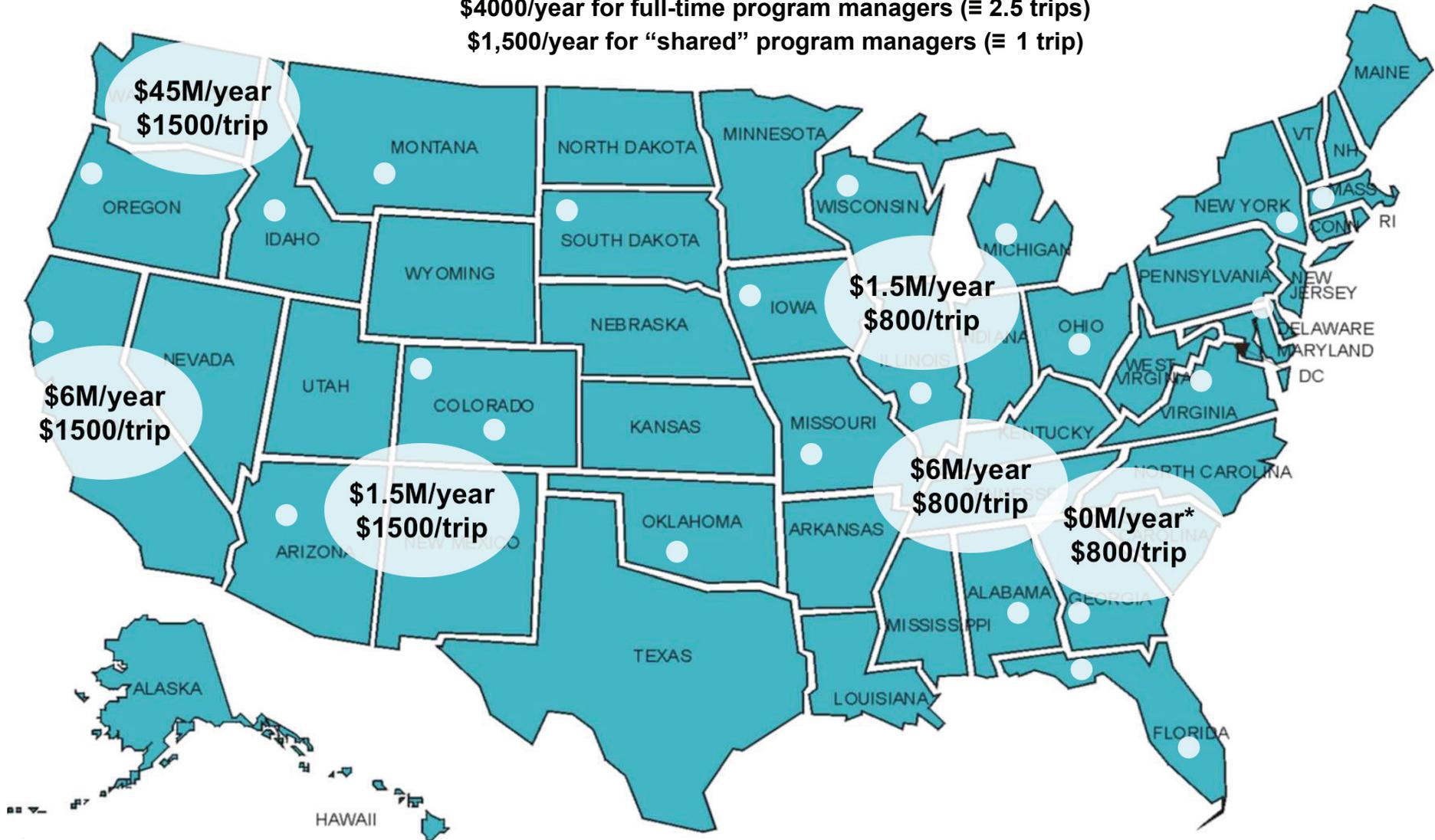


Travel budget

FY 2008 travel budget for ERSD = \$20,000

\$4000/year for full-time program managers (≡ 2.5 trips)

\$1,500/year for "shared" program managers (≡ 1 trip)





Multi-Scale Mass Transfer Processes Controlling Natural Attenuation and Engineered Remediation: An IFC Focused on Hanford's 300 Area Uranium Plume

Principal Investigator:

John Zachara, Ph.D.
Pacific Northwest National Laboratory

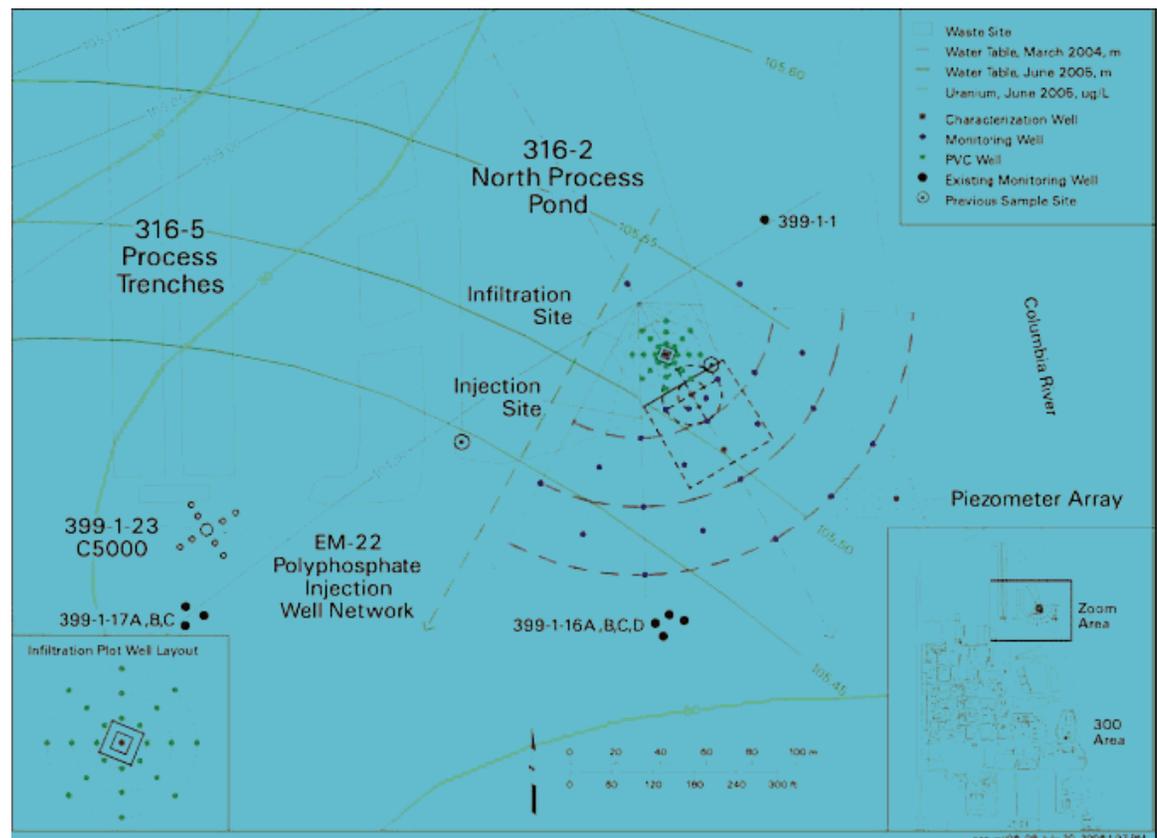
Field Site Manager:

Mark Freshley
Pacific Northwest National Laboratory

Co-Principal Investigators:

Gary Andersen (LBNL),
James McKinley (PNNL),
Don DePaolo (LBNL),
Mark Rockhold (PNNL),
James Fredrickson (PNNL),
Yoram Rubin (U. CA/Berkeley)
Roy Haggerty (Oregon State U.),
Jim Szecsody (PNNL),
Douglas Kent (USGS),
Roelof Versteeg (INL),
Alan Konopka (PNNL),
Andy Ward (PNNL),
Peter Lichtner (LANL),
Bruce Williams (PNNL),
Chongxuan Liu (PNNL),
Chunmiao Zheng (U. Alabama)

Experimental Test Plot at the Hanford 300 Area



Proposed design of the field experimental plot in the North end of the 300 Area. Characterization wells are drilled to 10' and finished at 4'. Monitoring wells are drilled to 4-6' and finished at 2'. Seasonal water table gradients and flow paths are noted.



Multiscale Investigations on the Rates and Mechanisms of Targeted Immobilization and Natural Attenuation of Metal, Radionuclide and Co-Contaminants in the Subsurface

Principal Investigator:

Philip M. Jardine, Ph.D.

Oak Ridge National Laboratory

Field Site Manager:

David B. Watson

Oak Ridge National Laboratory

Co-Principal Investigators:

Susan Hubbard (LBNL),

Craig Criddle (Stanford U.),

Joel Kostka (FSU),

Jack Parker ORNL),

Gregory Baker (UTK),

Craig Brandt (ORNL),

Scott Brooks (ORNL),

Baohua Gu (ORNL),

Ken Kemner (ANL),

Peter Kitanidis (Stanford U.),

Anthony Palumbo (ORNL),

Chris Schadt (ORNL),

Brian Spalding (ORNL),

Amy Wolfe (ORNL),

Wei-min Wu (Stanford U.),

Jizhong Zhou (OU)

Experimental Test Plot at the Oak Ridge Y-12 Area

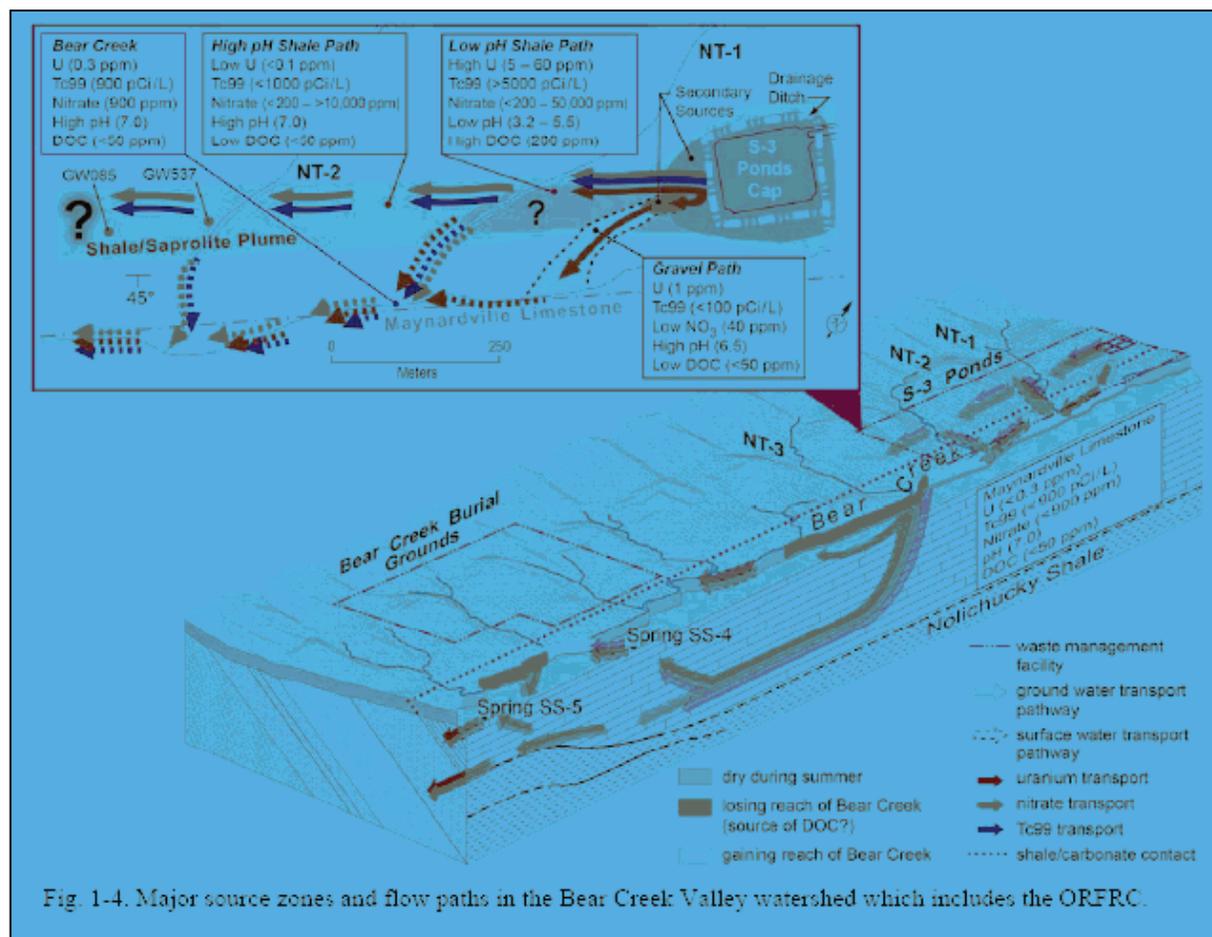


Fig. 1-4. Major source zones and flow paths in the Bear Creek Valley watershed which includes the ORFRC.



Microbiological, Geochemical and Hydrologic Processes Controlling Uranium Mobility: An Integrated Field-Scale Subsurface Research Challenge Site at Rifle, Colorado

Principal Investigator:

Philip E. Long

Pacific Northwest National Laboratory

Field Site Manager and co-Manager:

Richard Dayvault

Stan Morrison

SM Stoller-DOE Grand Junction Office

Co-Principal Investigators:

Jill Banfield (UC/Berkeley),

Darrell Chandler (Akonni Biosystems),

Jim Davis (USGS),

Bob Hettich (ORNL),

Peter Jaffe (Princeton U.),

Lee Kerkhof (Rutgers U.),

Ravi Kukkadapu (PNNL),

Mary Lipton (PNNL),

Aaron Peacock (UTK),

Nathan VerBerkmoes (ORNL),

Kenneth H. Williams (LBNL),

Steve Yabusaki (PNNL)

Collaborator: Derek Lovley (UMass)

Experimental Test Plot at the Old Rifle UMTRA site in Rifle, CO

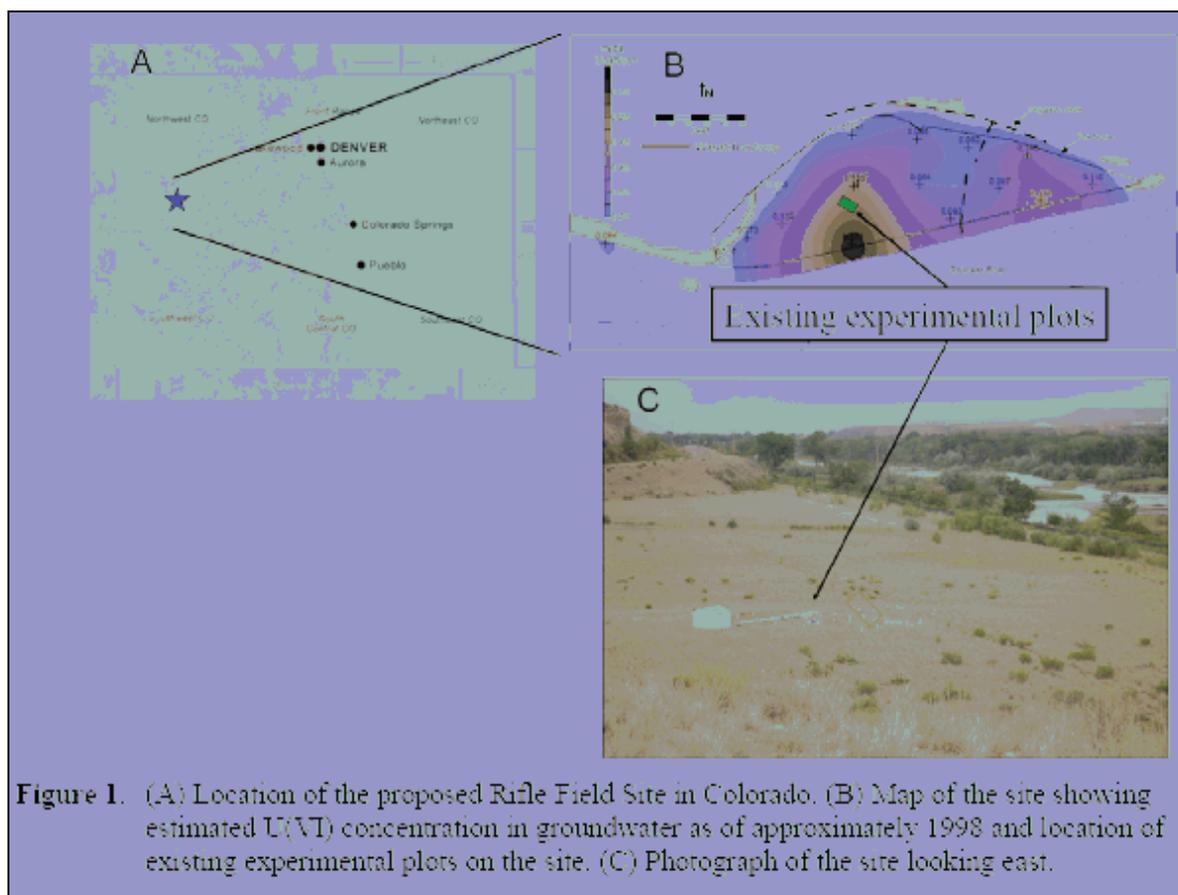


Figure 1. (A) Location of the proposed Rifle Field Site in Colorado. (B) Map of the site showing estimated U(VI) concentration in groundwater as of approximately 1998 and location of existing experimental plots on the site. (C) Photograph of the site looking east.



What can you do?

- Communicate – we like to talk to you!
- Great science! (that advances DOE's mission in environmental remediation)
- Notify us of your accomplishments
 - Publications, awards, Nobel prizes
- Acknowledge your funding source
- Consider EMSL & other DOE User Facilities in your research plan



Thank you's



- Field Research Executive Committee
- “External” participants
 - BES, EM, LM, EPA
- LBNL Team
 - “Technology Man”, Lisa Kelly &
- ERSD Staff